Health by Numbers

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Cerebrovascular Disease in Rhode Island: Risks and Burden

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The people of the United States experience about 700,000 strokes per year, of which about 500,000 are first attacks and about 200,000 are recurrent attacks. Case fatality is relatively high, resulting in 157,000 deaths per year, or about one death per 4-5 attacks. In addition, an estimated 5.5 million Americans are stroke survivors, many coping with residual problems. About one-fifth of stroke survivors report some functional limitation as a sequela of stroke.[1]

The risk of stroke increases with smoking, high blood pressure, high blood cholesterol, and overweight, and decreases with physical activity.[2] Untreated atrial fibrillation also increases the risk of stroke.[1] Elevated plasma homocysteine has also been suggested as a risk factor for cerebrovascular disease,[3] but recent studies designed to clarify this relationship have not found convincing evidence that elevated plasma homocysteine precedes atherothrombotic stroke,[4] or that lowering homocysteine decreases the risk of recurrent stroke and death among victims of non-disabling cerebral infarction.[5]

The risk of stroke is not distributed evenly in the United States population. Risk increases with age, and is higher for men than for women. African Americans and Hispanics are at higher risk of stroke (incidence) than non-Hispanic whites, although Hispanics are at *lower* risk of age-adjusted mortality from stroke than non-Hispanic whites.[1] Most (perhaps all) of the elevated risk of stroke (incidence) experienced by African Americans and Hispanics *may* be attributable to lifestyle, high blood pressure, high blood cholesterol, and overweight, although a definitive understanding of the role of these factors in creating disparate stroke burdens awaits the results of future studies, perhaps designed as clinical trials.

Optimal treatment of stroke requires early intervention to avoid mass destruction of brain cells. The symptoms of stroke vary and may be subtle. Thus, public awareness of stroke's early warning signs and symptoms is essential to assure the earliest possible diagnosis and treatment in each case. A nationwide public health survey conducted in 2001 revealed substantial public recognition (85 percent or higher) of the three most important warning signs of stroke: "sudden numbness or weakness of the face, arm or leg;" "sudden confusion, trouble speaking or understanding;" and "sudden trouble walking, dizziness or loss of balance or coordination."[1]

Stroke is recognized by the federal government as a serious health problem amenable to several public health interventions. Accordingly, Healthy People 2010, "a framework for prevention for the nation,"[2] incorporates two specific objectives for the reduction of stroke burden in the United States:

- 12-7. By 2010, reduce stroke deaths to 48 per 100,000 population (from 60 deaths per 100,000 in 1998).
- 12-8. Increase the proportion of adults who are aware of the early warning symptoms and signs of a stroke.

To assist with a new planning effort to reduce the risk of stroke and its sequelae in Rhode Island, basic data on health risks and stroke burden were assembled from the Rhode Island Behavioral Risk Factor Surveillance System,[6] the Rhode Island Hospital Discharge Data Set, and the National Center for Health Statistics.

Methods. Health Risks. Trend data on smoking, blood pressure checks, blood cholesterol checks, leisure time physical activity, fruits and vegetables in the diet, and overweight (by body mass index) in Rhode Island were extracted from a web-based data query system developed and maintained by the Behavioral Risk Factor Surveillance System (BRFSS) of the Centers for Disease Control and Prevention.[6]

Hospitalizations. Trend data on hospitalizations for stroke in Rhode Island were constructed from electronic files of the Rhode Island Hospital Discharge Data Set developed and maintained by the Center for Health Data and Analysis, Rhode Island Department of Health. All hospitalizations whose first discharge diagnosis was coded in the range 430-438 using ICD-9 were extracted for the analysis of trends.

Deaths. Trend data on deaths from stroke in Rhode Island were extracted from a web-based data query system (SEER*Stat)[7] developed and maintained by the Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute. Average annual age-adjusted stroke mortality rates were computed for whites and blacks by five-year period. The United States population of 2000 was used as the standard population for age-adjustment.

Results. Health Risks. With the exception of cholesterol checks, several risk factors for stroke (including very crude proxies for risk factors, like blood pressure checks) have not improved much since 1990. (Table 1) Smoking has declined

Table 1. Percentage of Rhode Island residents ages 18 and over with risk factors for stroke, 1990-2002, Rhode Island Behavioral Risk Factor Surveillance System

Year	Current smoking	No blood pressure check in 2 years	No cholesterol check in 5 years	No leisure time physical activity	Insufficient fruits and vegetables in the diet	Overweight or obese by body mass index
1990	26			26		48
1991	25			28		42
1992	22			26		45
1993	23	5	27		75	48
1994	25			27	78	49
1995	23	5	25			51
1996	24			27	76	51
1997	23	4	25			52
1998	23			30	75	54
1999	22	3	24			54
2000	23			28	71	56
2001	24		19			56
2002	22			25	71	
95% CI*	1.6	0.6	1.6	1.6	1.8	1.5

* 95 percent confidence interval for the latest estimate.

slightly, and the consumption of fruits and vegetables has increased slightly. The proportion of people getting no leisure time physical activity hasn't improved perceptibly, and neither has the proportion overweight or obese (by body mass index).

Hospitalizations. The number of hospital discharges in Rhode Island with stroke as the primary discharge diagnosis peaked in 1996, then declined slowly. (Figure 1) In 2004, the last full year for which data are currently available, the number of hospital discharges of this type numbered 3,137. The number of hospital discharges in Rhode Island with stroke as a secondary discharge diagnosis jumped dramatically after 1998, peaked in 2000, then declined slowly. In 2004, the number of hospital discharges of this type numbered 3,270.

Deaths. The age-adjusted death rate from stroke declined dramatically for both whites and African Americans in Rhode Island between 1969 and 2002. (Figure 2) The age-adjusted stroke rate declined 59% for whites, 63% for African Americans. At present, about 600 Rhode Islanders die from cerebrovascular disease each year.

In Rhode Island, African Americans have a 26% higher risk of stroke death than whites, after adjusting for age differences in the two populations. This disparity has declined from an all time high of 72% in 1986-1990, but is greater than the all time low of 7% in 1980-1984. At the present time, stroke death rates for African Americans and for whites appear to be converging.

Discussion. In 2004, the Rhode Island General Assembly enacted Chapter 23-77 of the Rhode Island General Laws, establishing the Rhode Island Stroke Task Force. (See Table 2 for a list of current Task Force Members. The Task Force is expanding.) The Task Force is charged with 14 objectives in the legislation, itself. Not surprisingly, the first objective concerns data analysis: "Undertake a statistical and qualitative examination of the incidence and causes of stroke deaths and risks, including identification of sub-populations at highest risk for developing stroke and develop a profile of the social and economic burden of stroke in Rhode Island." The trend data in the present report were assembled to begin the statistical examination of cerebrovascular disease in Rhode Island, its risks and burden.

Rhode Island behavioral health risk data for smoking, physical activity, fruits and vegetables in the diet, and overweight show little improvement between 1990 and 2002. A quick check of preliminary figures from Rhode Island's 2005 BRFSS show no major changes in these trend lines.[8] Smoking

Figure 1. Hospital Discharges for Stroke, Rhode Island, 1989-2004.

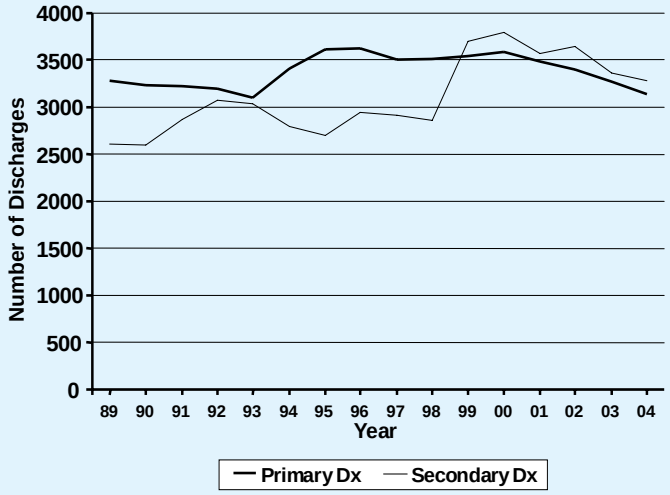

Figure 2. Average Annual Age-Adjusted Stroke Death Rate, Rhode Island, 1969-2002, by 5-Year Intervals.

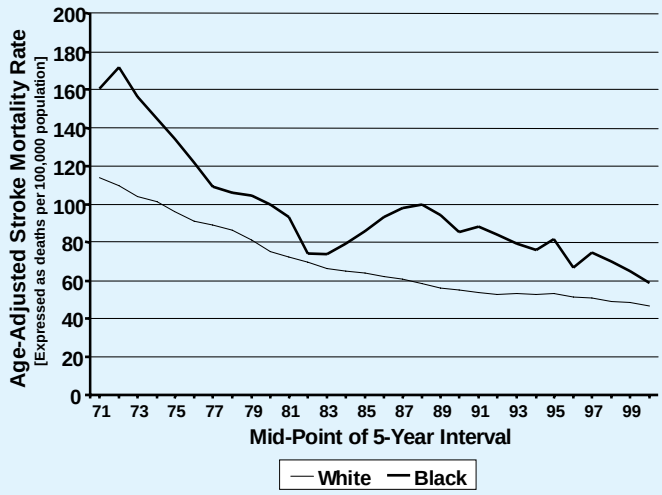

Table 2. Current membership of the Rhode Island Stroke Task Force established by the Rhode Island General Assembly

Member	Affiliation
Matthew Blade	The Miriam Hospital
Maureen Claflin	Quality Partners of RI
Raymond Cord, PA	Hypertension & Nephrology, Inc.
Douglas DeOrchis, MD (**Chair)**	The Miriam Hospital Stroke Center
Curtis Doberstein, MD	Rhode Island Hospital / The Miriam Hospital
Frank Gallo	Stroke Survivor
Peter A. Hollmann, MD	Blue Cross / Blue Shield of Rhode Island
Arshad Iqbal, MD	Arshad Iqbal, MD, Neurology & Stroke
Brandon Klar	Saint Joseph's Health Services of Rhode Island
William Koconos	American Heart Association, NE Affiliate
Thomas Lawrence, NREMT-P, I/C	Rhode Island Hospital
Kathleen Locarno, RN	Our Lady of Fatima Hospital
Sharon Marable, MD, MPH	Rhode Island Department of Health
Peter Panagos, MD	Rhode Island Hospital
Esther Price	Saint Martin dePorres Senior Center
Walter Van Dyck, OTRL-L, BCN	Kent County Memorial Hospital
Kathleen Walden, RN	Rehabilitation Center at Kent Hospital

continues to decline slightly, the trend in physical activity remains flat, and if any change in body mass index has occurred, we are heavier. As a state, we have much to do to reduce the risk of stroke (and cardiovascular disease, and diabetes, as well).

Given the flat trends in risk, the positive trends in hospitalization for stroke (as primary and secondary diagnoses) and in stroke mortality must be attributable to improvements in the medical management of stroke risks and stroke events. Further analysis of these interventions and their independent contributions to morbidity, disability, and mortality may be especially fruitful in guiding the work of the Task Force.

In the future, Rhode Island data on emergency department visits for stroke, available soon, may be used to construct a more comprehensive picture of stroke events, including those minor events (like transient ischemic attacks) that do not result in hospitalization. Potential enhancements to the Rhode Island BRFSS surveying blood pressure *control* and individual knowledge and understanding of lipid *profiles*, if affordable, would also help the Task Force track essential stroke risk factors and their distribution in the Rhode Island population.

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